An experimental augmented reality platform application for assisted maritime navigation: Following targets

Olivier Hugues, Jean-Marc Cieutat, Pascal Guitton

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An Experimental Augmented Reality Platform Application for Assisted Maritime Navigation: Following Targets

HUGUES, Olivier[1], CIEUTAT, Jean-Marc[2], GUITTON, Pascal[3]

[1]ESTIA Recherche - MaxSea, Bidart, France
o.hugues@net.estia.fr
[2]ESTIA Recherche, Bidart, France
j.cieutat@estia.fr
[3]University Bordeaux 1 (LaBRI) & INRIA
guitton@labri.fr

Abstract— **This paper deals with integrating a vision system with an efficient thermal camera and a classical one in maritime navigation software based on a virtual environment (VE). We then present an exploratory field of augmented reality (AR) in situations of mobility and the different applications linked to work at sea provided by adding this functionality. In our first example of applications, we present a how to follow moving targets and in particular "man overboard" targets for which we use data sent from an electronic life jacket. This work was carried out thanks to a CIFRE agreement within the company MaxSea.**

Augmented Reality, Mixed Environment, Image Processing, Human Factor, Combining exteroceptive data.

I. INTRODUCTION

The continuous progress of new technologies has led to a proliferation of increasingly smart and powerful portable devices. The capabilities of devices on board a ship now enable crews to be offered a processing quality and volume of information until now unrivalled. In a hostile environment such as the sea, users need a relevant flow of information. Computer assisted vessel management is therefore increasingly widespread and digitalization is an inescapable development. The three main aims are as follows:

1. Improved safety (property, environment and people).
2. Increased gains from productivity (fishing, etc).
3. The representations required for environmental control (orientation, location and direction).

These aims have led maritime software publishers to develop increasingly sophisticated platforms, offering very rich virtual environments and real time information updates.

II. RELATED WORK

There are many companies on the embedded maritime navigation software market. They can be separated into two categories. The first part includes those, which develop applications enabling embedded sensors to be taken advantage of (radar, depth-finder, GPS, etc.), such as Rose Point [4], and MaxSea International [14]. Other companies offer hardware platforms in addition to their software applications, like Furuno [10] and Garmin [11].

These environments enable navigation to be greatly improved by only showing the necessary information, eg. by combining satellites photos of the earth and nautical charts like PhotoFusion in Figure 1 proposed by MaxSea [14].

Figure 1. PhotoFusion: mixture of satellite photos and nautical charts (MaxSea) [14]

Maritime software are Geographic Information Systems (GIS). Few systems merge augmented reality technology (AR) and GIS. When a GIS is used for outdoor application, there are some issues to take into account [23]. In [25], an AR application is proposed to add geographical information on video flux during town exploration with direct vision. ARVino [26] is an AR application to show geographical information related to